

REMARKS

Claims 1-2, 4-6 and 8 are still pending in the application. Claim 1 is an independent claim drawn to method for producing power from a heat source, while claim 5 is an independent claim drawn to an apparatus for producing power from a heat source. Claims 1 and 5 have been amended to clarify the subject matter Applicants consider as inventive. Since support for the claim amendments is found in the specification as filed, namely in the figures and description thereof, Applicants submit that the amendments to the claims do not add new matter within the meaning of 35 U.S.C. §132.

Claims 1, 2, 4-6 and 8 stand rejected as being obvious over Bronicki in view of the Dow Chemical article.

The amendments to the claims and the discussion below of the rejection of the claims over the cited prior art are made in anticipation that the amendments will place the application in condition for allowance.

Rejection of Claims 1, 2, 4-6 and 8 Under 35 U.S.C. 103(a)

Claims 1, 2, 4-6 and 8 stand rejected under 35 U.S.C. 103(a) as being obvious over Bronicki (U.S. Patent No. 5,437,157) in view of the Dow Chemical Company 1983 article "Achieving Low pressure

Cogeneration with DOWTHERM Heat Transfer Fluids" for the reasons set forth in the Office Action.

RESPONSE

Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

The references of record, Bronicki and the Dow Chemical Company article, do not teach or suggest Applicants' inventive subject matter as a whole, as recited in the amended claims. Further, there is no teaching or suggestion in this reference which would lead the ordinary skilled artisan to modify the reference to derive the subject matter as defined in the amended claims.

The U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under § 103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of nonobviousness.

A. The present inventive subject matter

As amended above, claim 1 is directed to a method for

producing power from a heat source comprising the steps of: heating a synthetic, alkylated aromatic heat transfer fluid with heat from said heat source and producing a vaporized synthetic, alkylated aromatic heat transfer fluid in an intermediate fluid heater/vaporizer; supplying said vaporized synthetic, alkylated aromatic heat transfer fluid to an organic fluid vaporizer for supplying heat to organic liquid working fluid present in said organic fluid vaporizer; vaporizing said organic liquid working fluid with heat from the vaporized synthetic, alkylated aromatic heat transfer fluid in said organic fluid vaporizer to form a vaporized organic working fluid and a synthetic, alkylated aromatic heat transfer fluid condensate in said organic fluid vaporizer; expanding said vaporized organic working fluid in an organic vapor turbine for producing an expanded vaporized organic working fluid; generating power by use of an electric generator driven by said organic vapor turbine; condensing said expanded organic vaporized working fluid to produce an organic fluid condensate; and supplying the organic fluid condensate to the organic fluid vaporizer.

Likewise, independent claim 5 is directed to an apparatus for producing power from a heat source comprising: a synthetic, alkylated aromatic heat transfer fluid heater/vaporizer that heats and vaporizes the synthetic, alkylated aromatic heat transfer fluid

with heat from said heat source and produces a vaporized synthetic, alkylated aromatic heat transfer fluid; an organic fluid vaporizer that receives said vaporized synthetic, alkylated aromatic heat transfer fluid for supplying heat to an organic liquid working fluid present in said organic fluid vaporizer and vaporizes said organic liquid working fluid with heat from said vaporized synthetic, alkylated aromatic heat transfer fluid to form a vaporized organic working fluid and a synthetic, alkylated aromatic heat transfer fluid condensate in said organic fluid vaporizer; an organic vapor turbine that expands said vaporized organic working fluid, producing an expanded vaporized organic working fluid an electric generator driven by said organic vapor turbine for generating power; and an organic fluid condenser that condenses said expanded organic vaporized working fluid to produce an organic working fluid condensate so that the organic working fluid condensate is supplied to the organic working fluid vaporizer.

Claims 2 and 4 depend from claim 1, and claims 6 and 8 depend from claim 5. The dependent claims necessarily contain all of the limitations found in the independent claims. Thus, since the independent claims are not obvious over the prior art, so too, the dependent claims are not obvious.

B. The References

Bronicki (U.S. Patent No. 5,437,157) discloses a method and apparatus for cooling hot fluids. The cooling of a hot fluid is effected using a heat exchanger adapted to receive the hot fluid and liquid coolant for cooling the hot fluid such that the liquid coolant is vaporized. A turbine, having an output shaft connected to a fan, is responsive to vaporized coolant which expands in the turbine for driving the fan to move a mass of air, and produce vaporized coolant. A condenser receives the expanded vaporized coolant and is responsive to air blown by the fan, for condensing the expanded vaporized coolant thereby cooling the same and producing coolant condensate which is then returned to the heat exchanger.

The Dow Chemical Company article discloses the use of heat transfer fluids in cogeneration operations.

C. Differences between claimed invention and references

The differences between applicant's inventive subject matter and the cited references are readily apparent from their independent and distinct disclosures and claims. As is seen above in amended claims 1 and 5, the present inventive subject matter is directed to a method and apparatus that uses an electric generator

to produce power when driven by the organic vapor turbine. Further, the present claims include the limitation of the use of an organic, alkylated heat transfer fluid to transfer heat from the heat source to the organic working fluid. Applicant submits that these limitations are not found in the Bronicki patent, nor would one of ordinary skill in the art look to modify the Bronicki patent to include these limitations.

In particular, Applicants respectfully submit that Bronicki fails to teach the vaporization of **an organic working fluid** with heat from **the vaporized synthetic, alkylated aromatic heat transfer fluid** in an organic fluid vaporizer. Bronicki also fails to teach the use of an electric generator for producing power in conjunction with the organic vapor turbine.

In fact, Applicants respectfully submit that Bronicki teaches away from the use of an electric generator in conjunction with the organic vapor turbine. Specifically, Applicants direct the Examiner's attention to column 4, lines 15-25 which state "By using another fluid which is usually different from the fluid being cooled, the present invention gains a majority of the working power of the cooling cycle. The integration of the coolant cycle and the working power resulting from permits the fans of the coolant condenser (which is sized accordingly) to be run directly without

the necessity for additional auxiliary electricity. **This avoids the use of an electric generator to convert the work produced by the coolant turbine to electricity,** and the use of an electric motor to operate off the produced electricity to run the fans." (emphasis added). Thus, Applicants respectfully submit that the Bronicki patent teaches away from the use of an electric generator in its disclosed apparatus and method. Accordingly, one of ordinary skill in the art would **not** be led by the teachings of Bronicki to use an electric generator in conjunction with organic vapor turbine to produce power.

In addition, Applicants respectfully submit that the Bronicki patent is silent as to the type of heat transfer fluid to be used. The only discussion that the reference has regarding the heat transfer fluid is in columns 7 and 8, where the patent discusses choosing a heat transfer fluid according to the desired characteristics. Put another way, Bronicki is silent on teaching the use of a synthetic, alkylated aromatic heat transfer fluid.

In the present claims, the synthetic, alkylated aromatic heat transfer fluid is essential for proper performance of the claimed method and apparatus. Applicants respectfully have difficulty considering the steam in the steam turbine cycle of Fig. 3 of the Bronicki patent as a heat transfer fluid. Additionally, the steam

turbine cycle in Fig. 3 is **designed for maximizing the power output only**, and **not** for heat transfer to **another cycle**, as is claimed in the present claims.

Applicants further submit that this deficiency in Bronicki is not cured by the Dow publication. Nowhere within the Dow publication is disclosed replacing an intermediate steam power cycle with an alkylated heat transfer fluid power cycle. If one of ordinary skill in the art looks at the cycles disclosed in the Dow publication (referring to the use of the Dowtherm fluids), the skilled artisan would see that none of the cycles disclosed in the publication are similar to the claimed cycles in the present application. The cycle shown in Fig. 2 of the Dow publication depicts a Dowtherm heat transfer fluid power cycle with expanded Dowtherm fluid transferring heat to a steam turbine cycle or process. The present claims, on the other hand, are drawn to an alkylated aromatic heat transfer power cycle with the expanded alkylated aromatic heat transfer fluid transferring heat to an organic fluid power cycle for producing power using an electric generator driven by the organic fluid turbine present in the organic fluid power cycle. Further, Fig. 3 of the Dow publication is shown for process heat, something which is not dealt with by the present claims. Therefore, Applicants have difficulty

understanding how the Dow publication is relevant to the presently claimed invention.

Furthermore, one requirement for an obviousness rejection to be proper is the presence of a motivation to combine the references in an attempt to achieve the presently claimed inventive subject matter. In this case, Applicants respectfully submit that there is no motivation or teaching to combine the references. As is indicated above, The cycle shown in Fig. 2 of the Dow publication depicts a Dowtherm heat transfer fluid power cycle with expanded Dowtherm fluid transferring heat to a steam turbine cycle or process. The Bronicki patent, on the other hand, discloses a steam turbine extracting heat from a steam cycle. Further, Fig. 3 of the Dow publication is shown for process heat, something which is not dealt with by the Bronicki patent. Thus, Applicants submit that the disparate disclosures of the combined references do not provide motivation to combine them in an effort to achieve the presently claimed invention.

Assuming *arguendo* that the references are combined to attempt achieving the present claims, Applicants respectfully submit that the combination of references also fails to teach the presently claimed subject matter, i.e., the Dowtherm publication fails to cure the deficiencies of the Bronicki patent. Applicants submit

that the Bronicki patent is directly only to the effective cooling of hot steam. This has nothing to do with maximizing the power output of a given heat source having a certain amount of available heat. In other words, if a skilled artisan were to use a Dowtherm heat transfer fluid power cycle rather than a steam cycle in the Bronicki patent, Applicant submits that a lower pressure will be achieved by the Dowtherm fluid cycle and consequently a lower power output will be recognized in the cycle. Furthermore, by using the Dowtherm heat transfer thermal fluid in the power cycle, more heat will be transferred to the organic vapor or coolant cycle used for extracting heat, thus causing more heat to be extracted or lost from the power cycle, thereby further reducing the power output. No disclosure is made in the Bronicki patent of achieving **high power output for the organic fluid or coolant cycle**. In fact, the opposite is the case since more heat transferred to the organic fluid or coolant cycle in the Bronicki patent will result in increased losses of power since the organic fluid or coolant cycle is only designed for extracting heat from the steam cycle. This is even more evidence indicating that a skilled artisan would not combine the references in order to attempt achieving the presently claimed invention.

Thus, Applicants respectfully submit that the Examiner has failed to make a prima facie case of obviousness since the cited references fail to teach all of the limitations of the presently

claimed subject matter. Further, there is no motivation or teaching to combine the references in an attempt to achieve the present claims. Also, even if the references were combined, the resultant combination fails to teach the claimed subject matter.

For these reasons, Applicants respectfully submit that the present claims are not obvious over the Bronicki patent in view of the Dow publication.

CONCLUSION

In view of the foregoing, applicants respectfully request the Examiner to reconsider and withdraw the all pending rejections, and to allow all of the claims pending in this application.

If the Examiner has any questions or comments regarding this matter, he is welcomed to contact the undersigned attorney at the below-listed number and address.

Respectfully submitted,

NATH & ASSOCIATES

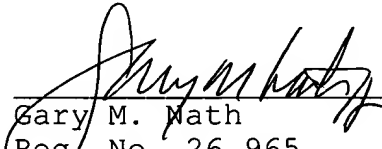
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